From the INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

PCT

TBK-Patent

Leson, Thomas, Johannes, Alois

Bavariaring 4-6 D-80336 München Tysk land

RECEIVED NGEN

(Chapter II of the Patent Cooperation Treaty)

NOTIFICATION OF TRANSMITTAL OF

INTERNATIONAL PRELIMINARY

REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing (day/month/year)

29-09-2004

Applicant's or agent's file reference

W034762

IMPORTANT NOTIFICATION

International application No.

International filing date (day/month/year)

28-06-2002

Priority date (day/month/year)

PCT/IB2002/002492

Applicant Nokia Corporation

et al

- The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
- 2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
- 3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in som Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, intentive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see Also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the IPEA/

Patent- och registreringsverket

Box 5055 S-102 42 STOCKHOLM

Facsimile No. 08-667 72 88 Authorized officer

17978 **PATOREG-S**

Telephone No. 08-782 25 00 Rakel Falk



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference					
WO34762	FOR FURTHER ACTION See	e Form PCT/IPEA/416			
International application No.	International filing date (day/month/y	rear) Priority date (day/month/year)			
PCT/IB 2002/002492	28.06.2002				
International Patent Classification (IPC) or	national classification and IPC				
H04L 12/56					
j					
Applicant					
Nokia Corporation et a	.1				
Monta corporation et a					
This report is the international preli Authority under Article 35 and tran	minary examination report, established is minary examination report, established is minary examination report, established in the same report report, established in the same report	d by this International Preliminary Examining Article 36.			
This REPORT consists of a total of					
3. This report is also accompanied by		•			
	- •	_			
(com to the applicant a	nd to the International Bureau) a total				
sheets of the de and/or sheets of Administrative	maining recurreations authorized by t	ich have been amended and are the basis of this report this Authority (see Rule 70.16 and Section 607 of the			
sheets which su	persede earlier sheets, but which this	Authority considers contain an amendment that goes			
beyond the disc Supplemental B	rosme in me international application	as filed, as indicated in item 4 of Box No. I and the			
6. (Sent to the International		e and number of electronic carrier(s))			
readable form only, as i Administrative Instructi	readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).				
4. This report contains indications relat	ting to the following items:				
Box No. I Basis of the					
Box No. II Priority					
Box No. III Non-estab	lishment of opinion with regard to no	velty, inventive step and industrial applicability			
	uity of invention	3			
Box No. V Reasoned applicabili					
Box No. VI Certain do	Box No. VI Certain documents cited				
	fects in the international application				
	servations on the international applica	tion			
Date of submission of the demand Date of completion of this record					
and of submission of the demand	Date of compl	letion of this report			
27.01.2004	27.09.2	004			
Name and mailing address of the IPEA/SE		Authorized officer			
Patent- och registreringsverket Box 5055					
3-102 42 STOCKHOLM	Kristof	fer Ogebjer/EK			
Facsimile No. +46 8 667 72 88 Form PCT/IPEA/409 (cover sheet) (January 2	Telephone No.	.+46 8 782 25 00			

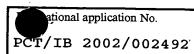
INTERNATIONAL PRE

NARY REPORT ON PATENTABILITY

ationa	etional application No.					
PCT/IB	2002/002492					

Bo	x No. I	Basis of the report				
1.	With	regard to the language, this report is based on the international application in the language in which it was filed, a rise indicated under this item.	ınless			
		This report is based on a translation from the original language into the following language which is the language of a translation furnished for the purposes of:				
		international search (under Rules 12.3 and 23.1(b))				
		publication of the international application (under Rule 12.4)				
		international preliminary examination (under Rules 55.2 and/or 55.3)				
2.	J	egard to the elements of the international application, this report is based on (replacement sheets which have ed to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally for not annexed to this report):	been îled''			
	Ш	the international application as originally filed/furnished				
	\boxtimes	the description:				
		pages 1-11 as originally filed/furnishe	ed			
		pages* received by this Authority on				
		pages* received by this Authority on	_			
	\bowtie	the claims:				
		pages as originally filed/furnished	žď			
		pages* as amended (together with any statement) under Article	19			
		pages* 1-4 received by this Authority on 17.05.2004	_			
		pages* received by this Authority on	_			
		the drawings:				
		pages 1-3 as originally filed/furnishe	xd			
		pages* received by this Authority on	_			
		1000 FOR AUTOM OF THE PART OF	-			
		a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.				
3.		The amendments have resulted in the cancellation of:				
		the description, pages				
		the claims, Nos.				
		the drawings, sheets/figs				
		the sequence listing (specify):				
		any table(s) related to the sequence listing (specify):	ı			
4.		This report has been established as if (some of) the amendments annexed to this report and listed below had not be nade, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (I 0.2(c)).	xeen Rule			
	j	the description, pages				
		the claims, Nos.				
		the claims, Nos.				
	i	the drawings, sheets/figs	.			
	i	the sequence listing (specify):				
		any table(s) related to the sequence listing (specify):				
' Ij	f item 4	applies, some or all of those sheets may be marked "superseded."				
		A (400 T)	1			

INTERNATIONAL PRI NARY REPORT ON PATENTABILITY



Box No. V Rea	soned statement u	ınder Article tions supporti	35(2) with regard to novelty, inventive step or ing such statement	r industrial applicability;
1. Statement				
Novelty (N))	Claims Claims	1-25	YES NO
Inventive sto	ep (IS)	Claims Claims	1-12,16-25 13-15	YES NO
Industrial ap	pplicability (IA)	Claims Claims	1-25	YES NO

2. Citations and explanations (Rule 70.7)

Cited documents:

D1: US, A, 6272522

D2: EP, A, 0782072

D3: US, A, 2001043585

D4: US, A, 5655120

D5: US, A, 2002064160

D6: US, A, 5978844

D7: US, A, 4748558

The object of the invention is to make the load balancing more efficient by introducing a load balancer.

D1 relates to a load balancing system that stores the load state of the different processors. The shared memory 34 contains a program that executes in the background to retrieve the information stored in the routing table 62 and maintains the status of the routing table 62 as changes are made to the configuration. This feature is considered to be an equal feature as the feature of containing information about the connection state (abstract).

D2 discloses a system that obtains information about the load and the connection state from servers.

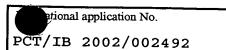
D3 discloses a system where a ZNK sends a packet to a node based on the link and the load of the node.

relates to a system that distributes the load among processors based the load of the processors.

.../...

INTERNATIONAL PRE

NARY REPORT ON PATENTABILITY



Box No. VI	Certain documents cited			-, 2002, 002132		
Certain published documents (Rule 70.10)						
·	Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)		
US, A,	2002087694	04/07/2002	29/12/2000			
2. Non-writte	n disclosures (Rule 70.9)					
K	Cind of non-written disclosure		ritten disclosure nth/year)	Date of written disclosure referring to non-written disclosure (day/month/year)		
				J⁺		

Supplemental Box

In case the space in any of the preceding boxes is not sufficient. Continuation of: Box V

D5 discloses a method that after the call connection request is received the loads supported by a plurality of packet processors are compared. The call connection is then assigned to the packet processor having a load that is no larger than the load supported by any other of the plurality of packet processors.

D6 relates to a system where forwarding means reports the load of the processors to adjusting means. Based on the load the forwarding processor with least load is selected to process a packet.

D7 relates to a system that contains a global processor that examines the load status indicator contained therein which shows the load status of each of the system processors; selects the processor having the lightest load status; and issues an order to treat the service demand from the requesting terminal to the selected processor having the lightest load.

D1 is considered to be the closest state of the art.

The feature of containing information about the load state of the processors and selecting processor for a packet based on this information is known from what D1 discloses. Even though the connection state is not mentioned per se in D1, the routing table contains information about the connection. From what is stated in D1 and the fact that a processor can handle packets from plural connections in general the invention according to claim 13 is considered obvious for a person skilled in the art. In claim 13 it is not clear that the balancing is based on a per-packet basis irrespective where of the specific connection to which a specific packet belongs.

The invention according to claims 14,15 merely states details known or obvious to a person skilled in the art and the details require no inventive activity to implement in a system according to D1. The invention according to claims 14,15 lacks an inventive step.

The cited documents represent the general state of the art.

.../...

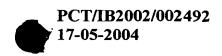
Supplemental Box

In case the space in any of the preceding boxes is not sufficient. Continuation of: Box V

The invention defined in claims 1-12 and 16-25 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method, device and system where the balancing is based on a per-packet basis irrespective where of the specific connection to which a specific packet belongs. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-12 and 16-25 is novel and is considered to involve an inventive step. The invention is industrially applicable.



Enclosure of May 17, 2004

PCT-Patent Application No.: PCT/IB02/02492

Nokia Corporation et al.

Our ref: WO 34762

不過 有利無人 美名人用名等於人

New claims 1 to 25

5

25

30

10 1. A method for balancing the load of resources in a packet switched connection within a communication system, said system comprising processing units (11; 12) for performing communication, at least one load balancing unit (12; 22) for distributing the load to said processing units (11; 12), and a data storage (14; 24), said mathod.

5 12), and a data storage (14; 24), said method comprising the steps of:

obtaining a current connection state as well as a current load state of said processing units from said data storage (14; 24);

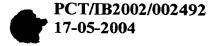
selecting by said load balancing unit (12; 22) a processing unit on a per packet basis irrespective of a specific connection to which a respective packet belongs;

maintaining information about the load state of each processing unit (11; 21) so that said selecting step is performed by selecting a processing unit to serve and process a respective packet based on the load state.

- 2. A method according to claim 1, wherein said data storage is accessed to by said load balancing unit.
- 3. A method according to claim 1, wherein said data storage is accessed to by said processing units.
- 4. A method according to claim 1, wherein said information about the load state is maintained as a Boolean state.

AMENDED SHEET





- 5. A method according to claim 1, wherein a processing unit is selected in a round-robin fashion.
- 6. A method according to claim 1, wherein a supported service profile for each processing unit is maintained.
 - 7. A method according to claim 6, wherein said supported service profile is used as additional selection criteria.
- 8. A method according to claim 1, wherein said load balancing unit obtains a load state from each processing unit upon a hardware based mechanism.
- 9. A method according to claim 1, wherein said load
 15 balancing unit obtains a load state from each processing unit upon a packet based mechanism.
 - 10. A method according to claim 9, wherein a load state of a processing unit is inserted into a packet processed by said unit.
 - 11. A method according to claim 9, wherein a packet returned by a processing unit is interpreted as a flag for a free resource.
 - 12. A method according to claim 1, wherein excess traffic is redirected to another load balancing unit, said excess traffic being defined upon the number of active processing units.
 - 13. A device unit for serving and processing packets of a communication connection, comprising:

means adapted to inform a load state of said device to a balancing unit; and

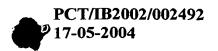
AMENDED SHEET

25

30

20

3/4



means adapted to obtain a state of said communication connection,

wherein said device unit is adapted to serve and process packets of plural connections.

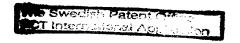
5

- 14. A device unit according to claim 13, wherein said obtaining means is adapted to retrieve said communication connection state from a data storage.
- 10 15. A device unit according to claim 13, wherein said obtaining means is adapted to retrieve said communication connection state from a packet being under processing.
- 16. A device unit for balancing a load of each of multiple processing units performing a packet switched communication connection, comprising:

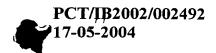
means for maintaining a load state of each of said processing units; and

means adapted to select a processing unit on the basis
of a respective load state on a per packet basis
irrespective of a specific connection to which a respective
packet belongs.

- 17. A device according to claim 16, wherein a load state of 25 a processing unit is contained in a table.
 - 18. A device according to claim 16, wherein a load state of a processing unit is expressed as a Boolean value.
- 19. A device according to claim 16, wherein a load state of a processing unit is expressed as value which corresponds to the percentage of load.
- 20. A device according to claim 16, wherein said selecting means is adapted such that a processing unit is selected







also on the basis of a parameter indicating the service profile supported by a respective processing unit.

- 21. A device according to claim 20, wherein said parameter is contained in a table.
 - 22. A device according to claim 16, further comprising means adapted to insert a communication connection state into a packet to be routed.
 - 23. A device according to claim 16, wherein the processing units are comprised of multicore digital signal processing means having a shared data storage for all cores, whereby said device comprises a first level of load balancing for selecting a digital signal processing means and a second level of load balancing for selecting a single core.
- 24. A device according to claim 16, further comprising means for redirecting excess traffic to another device
 20 according to claim 16, wherein said excess traffic is defined upon the number of active processing units.
 - 25. A system adapted to perform a method according to any of the claims 1 to 12.

25

5

10

15